

**3M** Certified Platinum Partner



Est. 1979  
(888)616-1488  
[www.solartint.com](http://www.solartint.com)



# Outline

- **3M Window Film Products Overview**
- Energy Control Window Films
- Safety and Security Window Films
- Attachment Systems
- Daylight Redirecting Window Film
- Decorative Window Films

Renewable Energy Division  
**3M Window Films**

Jason Young Solar Tint

*Solar Tint* 



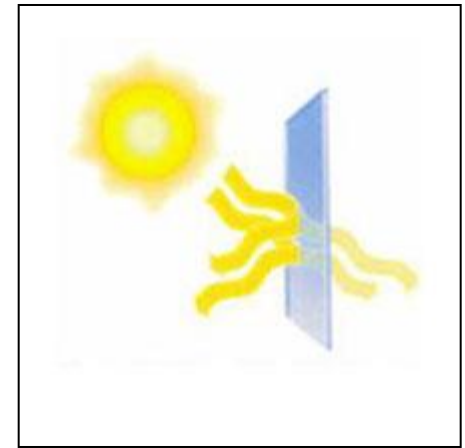
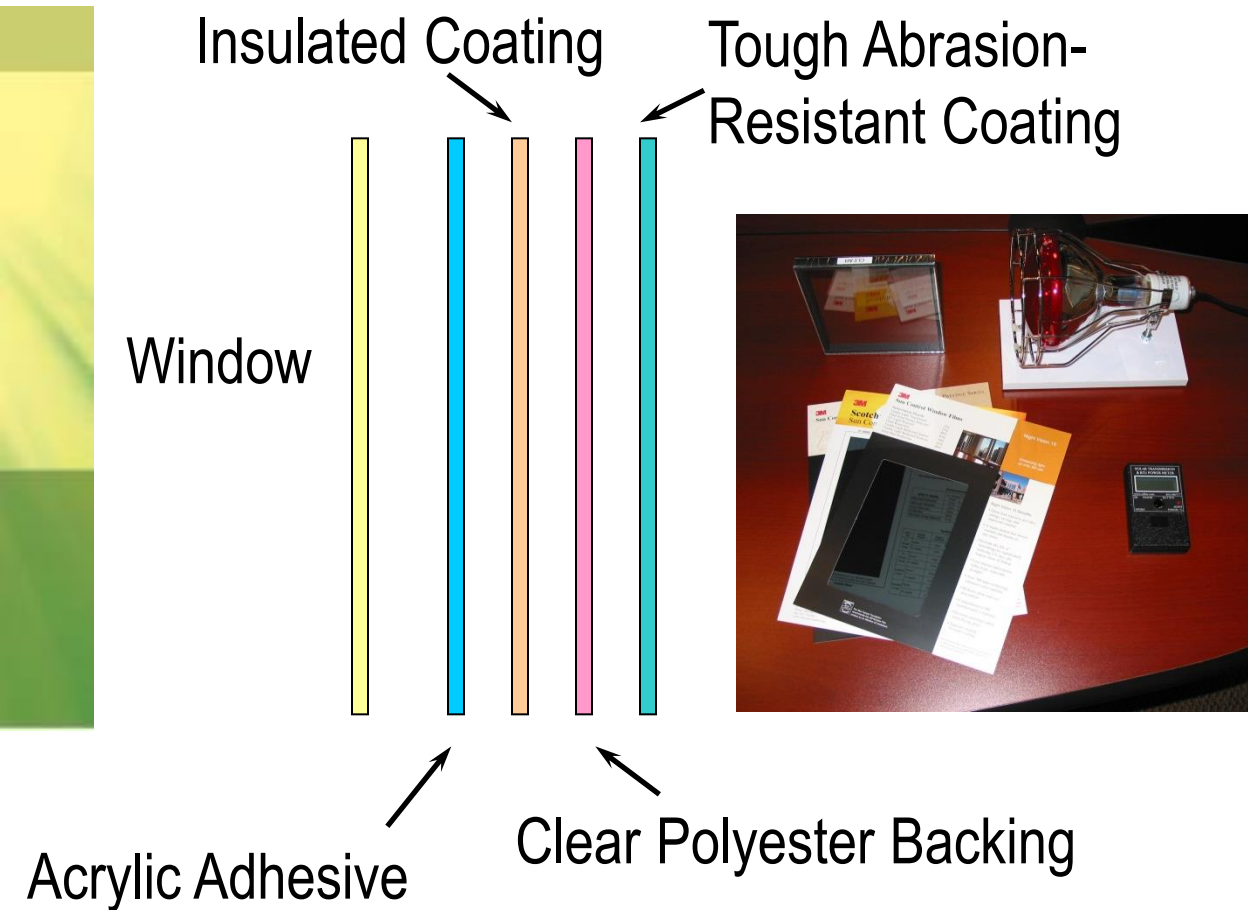
<sup>3</sup> March 17, 2015



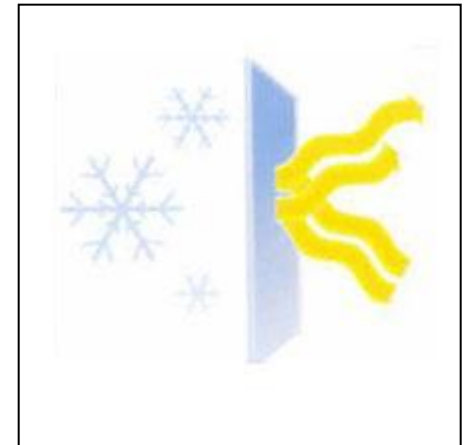
## Sun Control Window Film Executive Summary

- Reduce utility bills 2%-12%
- Reduce temperatures 5°-12°F
- Receive 2-11 LEED points
- Improve E\* Portfolio Manager Score
- May be eligible for utility rebates

# What is 3M Sun Control Window Film?



3M Sun Control Window Films stop much of the sun's heat before it enters your building.



3M All Season Window Films reduce heat loss by reflecting radiant heat back inside the building envelope.

# 3M Sun Control Window Film Overview

## Why the need for 3M Window Film?

- Reduce A/C bills
- Reduce heating bills
- Increase Tenant Comfort / Reduce Temperature Imbalances
- Increase HVAC equipment life
- Reduce fabric fade
- Reduce glare and eye discomfort



## Other product benefits:

- Protect tenants from a nearby explosion
- Help prevent unwanted entry
- LEED Sustainable Design
- May be eligible for tax credits & utility rebates

- Reduces Peak Loads
  - Passive System
- No Maintenance Required
- Life Expectancy > 20 years



# 3M Case Study- Kenton County Schools

## **3M Window Film**

- Installed 18 Buildings in 2014
- Covered over 100,000 square feet in 3M Night Vision 15
- 1/5<sup>th</sup> of the project paid for by the Utility Company
- Projected Payback Under 5 Years



***Protect Investments while preserving views***





# 3M Case Study- The Fifth Third Center

## **Before 3M Window Film**

- High energy bills and tenant discomfort

## **After 3M Window Film**

- RE 20 Installed
- Reduce Energy Costs. Saved \$100K in energy bills in first year alone
- Improved tenant comfort



***Protect Investments while preserving views***



**FIFTH THIRD BANK**

**3M**

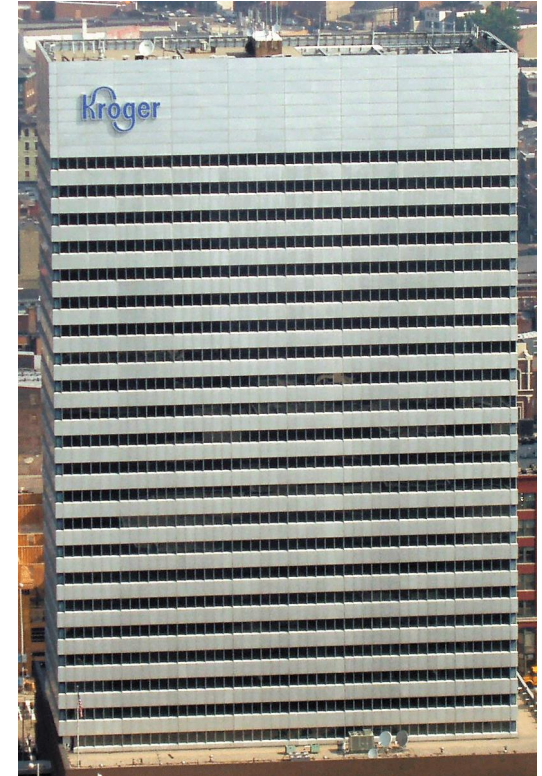
# 3M Case Study- Kroger, Cincinnati, OH

## **Before 3M Window Film**

- High HVAC load and temperature imbalances in building.

## **After 3M Window Film**

- RE 20 installed on 90K sq. ft including all four sides.
- Reduce Energy Costs.
- Balanced temperature



***Protect Investments while preserving views***

# 3M Case Study- City Hall, Cincinnati, OH

## **Before 3M Window Film**

- High energy bills and contracted with ESCO who recommended 3M Window Film.

## **After 3M Window Film**

- PR40 installed on 11, 500 sq. ft to preserve appearance
- Reduce Energy Costs. Part of overall program that resulted in one year payback



***Protect Investments while preserving views***

## Deterring Forced Entry for Schools



To Help Keep Danger Out  
Bring 3M In



# School Shootings on the Rise



- Columbine High School, April 20, 1999
- Virginia Tech, April 16, 2007
- Sandy Hook Elementary, Newton, CT, Dec. 14, 2012
- Taft Union High School, Bakersfield, CA, Jan 10, 2013
- Stevens Institute of Business & Arts, St. Louis, MO, Jan 15, 2013
- Hazard Community and Technical College, KY, Jan 15, 2013
- Berrendo Middle School, Roswell, NM, January 14, 2014
- Reynolds High School, Troutdale, OR June 10, 2014

# Mode of Entry into Schools

- Many schools have locked doors during operation
- Weak point is glass
- Most schools do not have bullet resistant glazing or even laminated glass, just tempered glass
- Shooter can easily get through glass with single shot



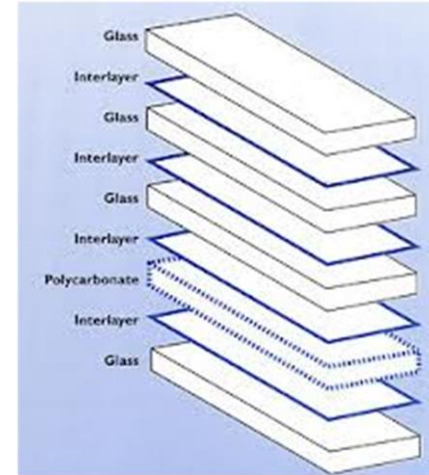
# Fortifying Glass in Schools

## ■ Options

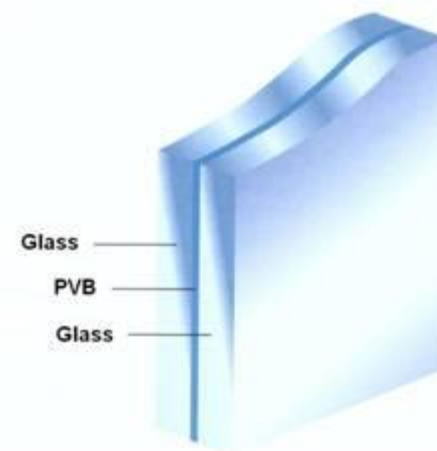
- *Bullet Resistant Glass*
- *Laminated Glass*
- *Costly*

## ■ Safety and Security Film with an attachment system

- *Cost effective*
- *Easily applied and uses existing glazing*
- *Only a deterrent to help buy precious time to get to safety and to respond*
- *Optically clear film catches intruder off guard when attempting to break glass*



BRG



Laminated Glass

# Safety & Security Window Films



Deterring Smash-n-Grab / Break & Entry



Blast Mitigation



Windstorm Protection



Seismic Preparedness



Safety Glazing / Human Impact Safety



Spontaneous Glass Breakage

Safety and Security films  
are widely used in a  
variety of applications





# Safety & Security Window Films



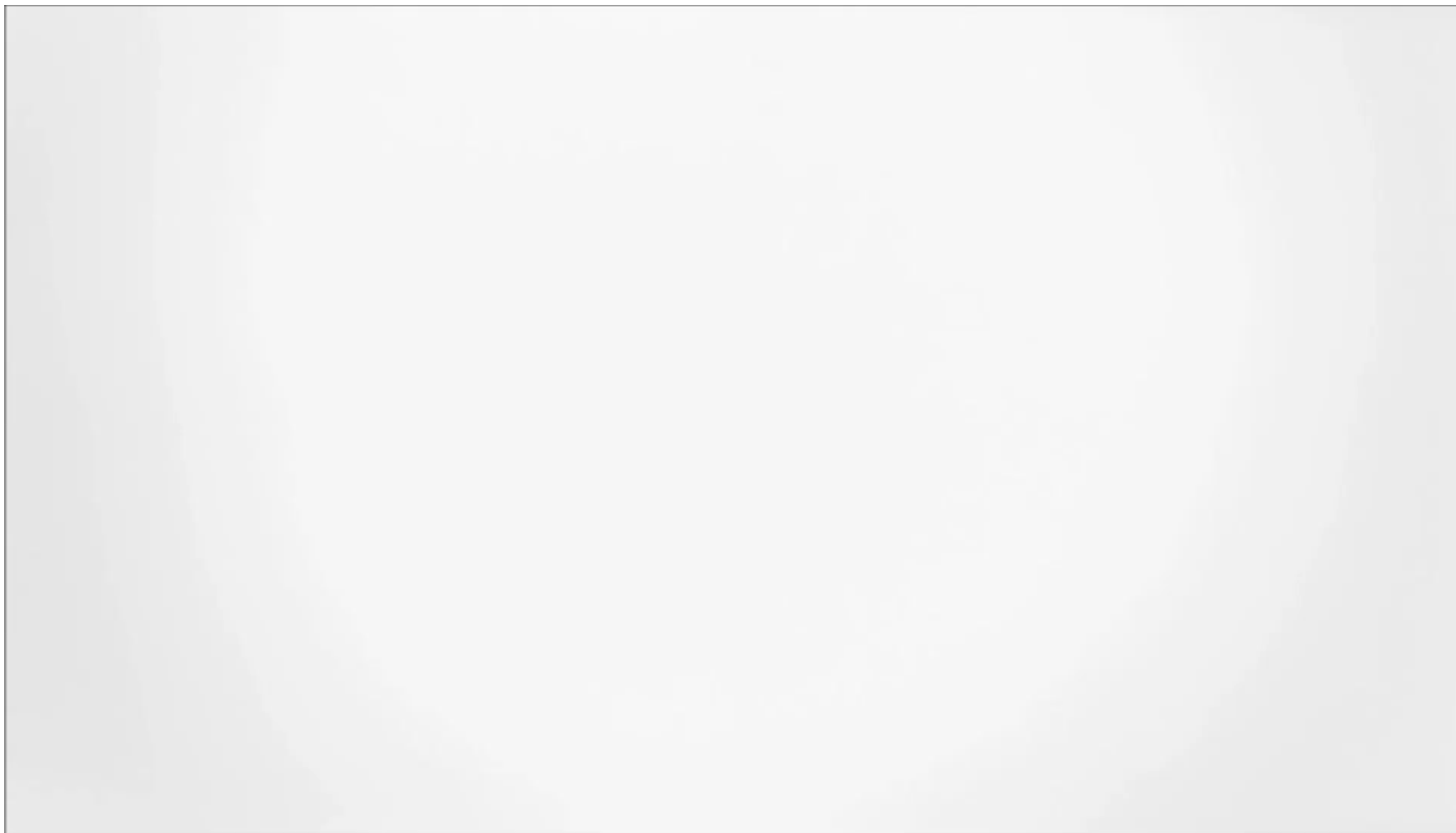
- NOT bullet proof
  - *Bullet will go straight through film and glass*
  - *Will leave behind a bullet hole in the glass*
- NOT impenetrable
  - *Only a matter of time before an intruder will gain access*
  - *Depends on:*
    - *Intruder preparedness*
    - *Determination*
    - *Tool usage*
    - *Number of impacts*
    - *Impact force*
    - *Strength of film*
    - *Strength of film anchorage system*
    - *Strength and thickness of glass*
    - *Size of opening required to gain access*

# How S&S Films Work

- Film + strong adhesive forms a protective membrane on the glass
  - *Opposite attack face*
  - *Protected from elements*
- Does not prevent glass from breaking, but holds broken glass fragments together
- Film attachment systems applied along perimeter to anchor the film to the window frame
  - *Forces intruder to create opening through center of broken glass*



# How it Works



# Firearms Testing

AR-15 semiautomatic assault rifle



1/4" Tempered glass  
Ultra S600

- Shows general concept of glass fragment retention after bullet penetration
- To date, most industry ballistic testing of films for purpose of anti-spall on BRG (Bullet Resistant Glass), not effectiveness as Break and Entry deterrent

***NO FILM STOPS A BULLET!***





# Selecting a Film for School Systems

- Primary Considerations
  - *Product Properties*
    - *Tear Resistance*
    - *Film Thickness*
    - *Peel Strength (Adhesion to Glass)*
    - *Visual Quality*
- Other
  - *Ease of Installation*
  - *Installed Cost*
  - *Installer experience / references*
  - *Durability / Warranty*

# Film Properties

## ■ Film Thickness

- *The defining feature of most Safety/Security films*
- *Thicker film is tougher to puncture (penetrate), BUT:*
  - *May be more difficult to install*
    - Can drive up cost and occurrence of installation related defects
  - *Longer dry times*
    - Can be 45 – 60 days or longer
  - *Lower optical quality (haze, clarity, yellowness, distortion, etc)*
- *Recommend no thinner than 8-mil (0.008”) standard polyester based film*

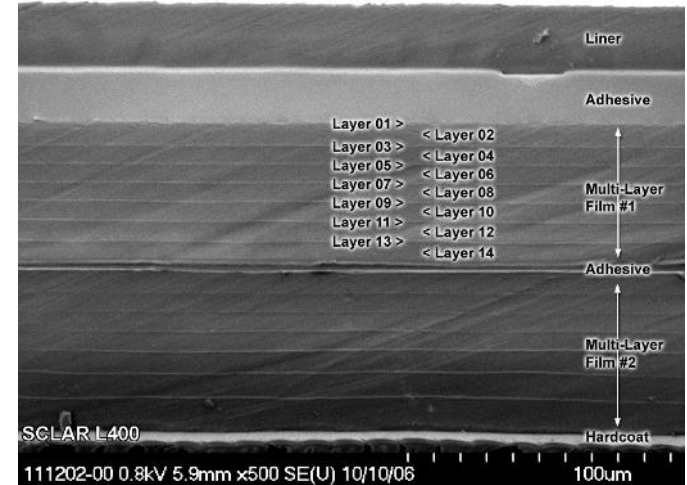


- 3M™ Safety S140 Safety and Security Window Film (14 mil)
- 3M™ Safety S80 Safety and Security Window Film (8 mil)

# Film Properties

## ■ Tear Resistance

- *Offered only by 3M™ Ultra Safety and Security Window Films*
- *3M Patented micro-layered technology*
- *Ultimate combination of tear-resistance, flexibility, energy absorption, and ease of installation*



# Detering Break and Entry



- 3M Film + Attachment installed in 100's of national retail stores
- Helped to prevent robberies or slowed down criminals in time for officials to apprehend them



# 3M™ Ultra S600

- Our thickest tear resistant film (6 mils, 0.006")
- 42 micro-layers
- Installs easily
- Outperformed laminated glass in bomb blast testing\*
- Tear resistance inhibits & deters expansion of opening for body passage

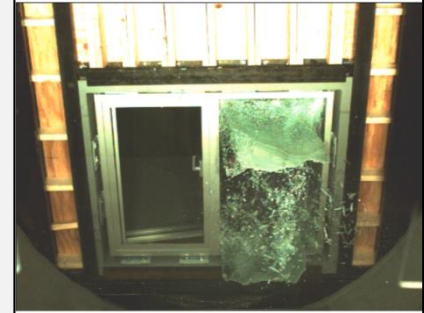
\* Double pane units:

Exterior pane - 1/4" H.S

Interior pane - 1/4" A.G. / 0.030" PVB / 1/4" A.G.

Casement Window – 10 psi, 89 psi\*msec

Laminated Glass



High Hazard

Ultra S600



Minimal Hazard

# 3M™ Ultra S800

- Our thickest tear resistant film (8 mils, 0.008")
- Micro-layered
- Optically clear
- Tear resistance inhibits & deters expansion of opening for body passage

## 3M™ Scotchshield™ Safety and Security Window Film

### Ultra S800

#### Technical Data

##### Product Features & Benefits

- Micro-layered film designed for tear resistance
- Optically clear
- Applies to interior glass surfaces
- Helps protect from broken glass hazards
- Helps protect against damaging effects of UV light

##### Suggested Applications

- Bomb Blast Mitigation
- Deterring Break and Entry
- Safety Glazing
- Spontaneous Glass Breakage
- Seismic Preparedness

##### Performance Testing\*

Method	Glass Substrate	Film Attachment	Rating	
Safety Glazing / Impact Resistance				
16 CFR 1201	1/2' & 1/8' annealed	--	Category 2, 400 ft-lbs	
ANSI Z97.1			Class A (Unlimited), 400 ft-lbs	
Missile Impact and Pressure Cycling				
ASTMs E1886 / E1996	1/2' tempered	IPA	Large Missile C, +/- 75 psf	
ASTM E330	3/16" tempered		+/- 100 psf	
Blast Mitigation			Blast Load	Rating
GSA TS01-2003 / ASTM F1642	1/2' annealed	IPA	6 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
		IPP	7 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
	1/2' tempered	IPA	6 psi, 42 psi/msec	GSA Level 2 / ASTM "No Hazard"
		IPP	7 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
	1" double pane (annealed)	IPA	10 psi, 80 psi/msec	GSA Level 2 / ASTM "No Hazard"
		IPP	9 psi, 60 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"

##### Film Properties\* (nominal)

Film Thickness	8 mils	Graves Area Tear Resistance (ASTM D1004)	1,200 lbs/ft
Film Construction	Micro-layered	Puncture-Propagation-Tear Resistance (ASTM D2582)	9.5 lbf
Tensile Properties (ASTM D882)		Puncture Strength (ASTM D4830)	185 lbf
Tensile Strength	27,000 psi	Abrasion Resistance (ASTM D1044)	3% Δ haze
Break Strength	215 lbs/in	Peel Strength (ASTM D3330)	6.1 lb/in
Elongation at Break	95%	Flammability (ASTM E84)	Class A
Yield Strength	15,000 psi	<b>Solar Properties</b> - film applied to 1/4" clear glass	
Elongation at Yield	8%	Visible Light Transmitted	87%
Modulus	575 kpsi	UV Light Rejected	99.9%

\*not for specification purposes

# Attachment Systems

- Attachment Systems help contain filmed broken glass in the window frame
- Creates bond between film and frame to anchor the glazing system
- Types:
  - 3M™ Impact Protection Adhesive
    - structural sealant wet-glaze
  - 3M™ Impact Protection Profile
    - flexible-mechanical attachment with VHB structural glazing tape

- Attachment systems always enhance protection
- Mandatory on tempered glass



Forces intruder to pass through hazardous shards of glass



# Summary

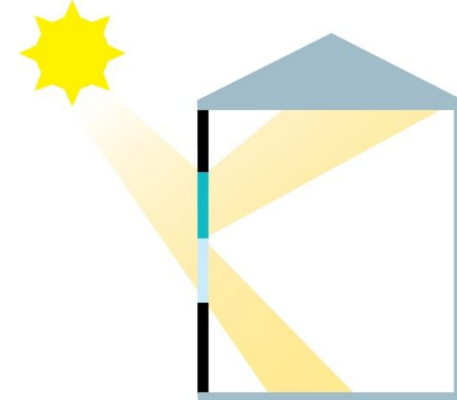
- The Scenario we're trying to address...
  - *To SLOW DOWN a single intruder with firearm as their only (primary) device*
  - *Unprepared for strengthened glass*
  - *Cannot pass through bullet hole, must create and expand opening large enough for body passage*
- Security Films and Attachment Systems are quick and cost effective way to fortify existing glazing
  - *Easy to implement, utilize existing glazing*
  - *Not bullet proof or impenetrable, but can buy precious time for occupants to respond*
- Recommended 3M Products
  - *Ultra S800 – tear-resistant film option*
  - *Safety S140 – thickest film for most vulnerable areas*
  - *Impact Protection Attachment – essential for slowing down the intruder*
    - *Impact Protection Adhesive*



# Daylight Redirecting Film

<https://www.youtube.com/watch?v=kM9pEUT735Y>

- Redirects natural light to the ceiling to increase comfort and provide natural light deeper in the building.
- Can be used in new construction or existing buildings
- Easily installed



No Film

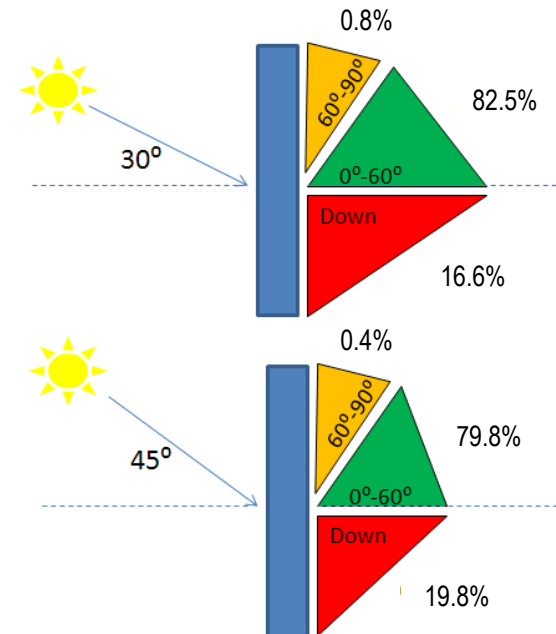
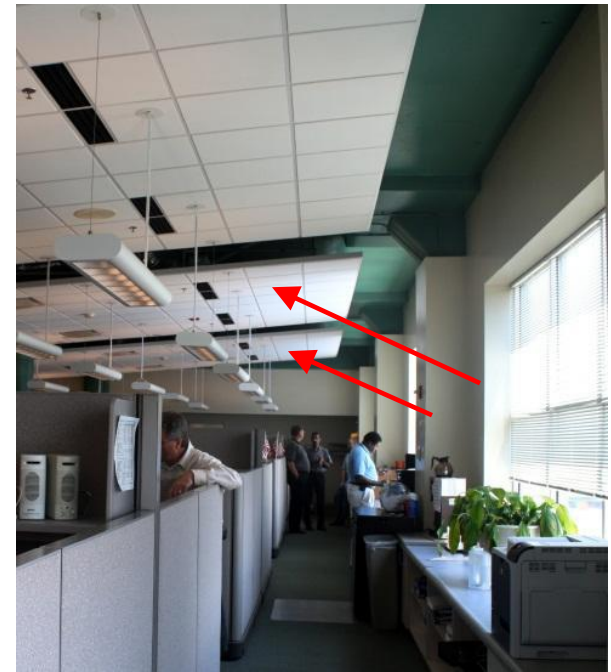


With Film



# Daylight Redirecting Film

- Designed to control where the light goes
  - *Lessens glare*
  - *Redirects natural light up to the ceiling*
- Extends 'daylight zone' about 8' into room for each 1' of treated upper window
- Can be combined with solar control films & blinds
- Redirects over 80% of the light towards the ceiling on average



# Fasara Glass Finishes



Fasara glass finishes are perfectly suited for interior glass doors or the inside surfaces of windows. Use our decorative window films for:

- Conference rooms
- Lobbies
- Retail environments
- Residential settings
- Private offices
- Exterior windows
- Partitions

# Fasara Glass Finishes





# Fasara Glass Finishes

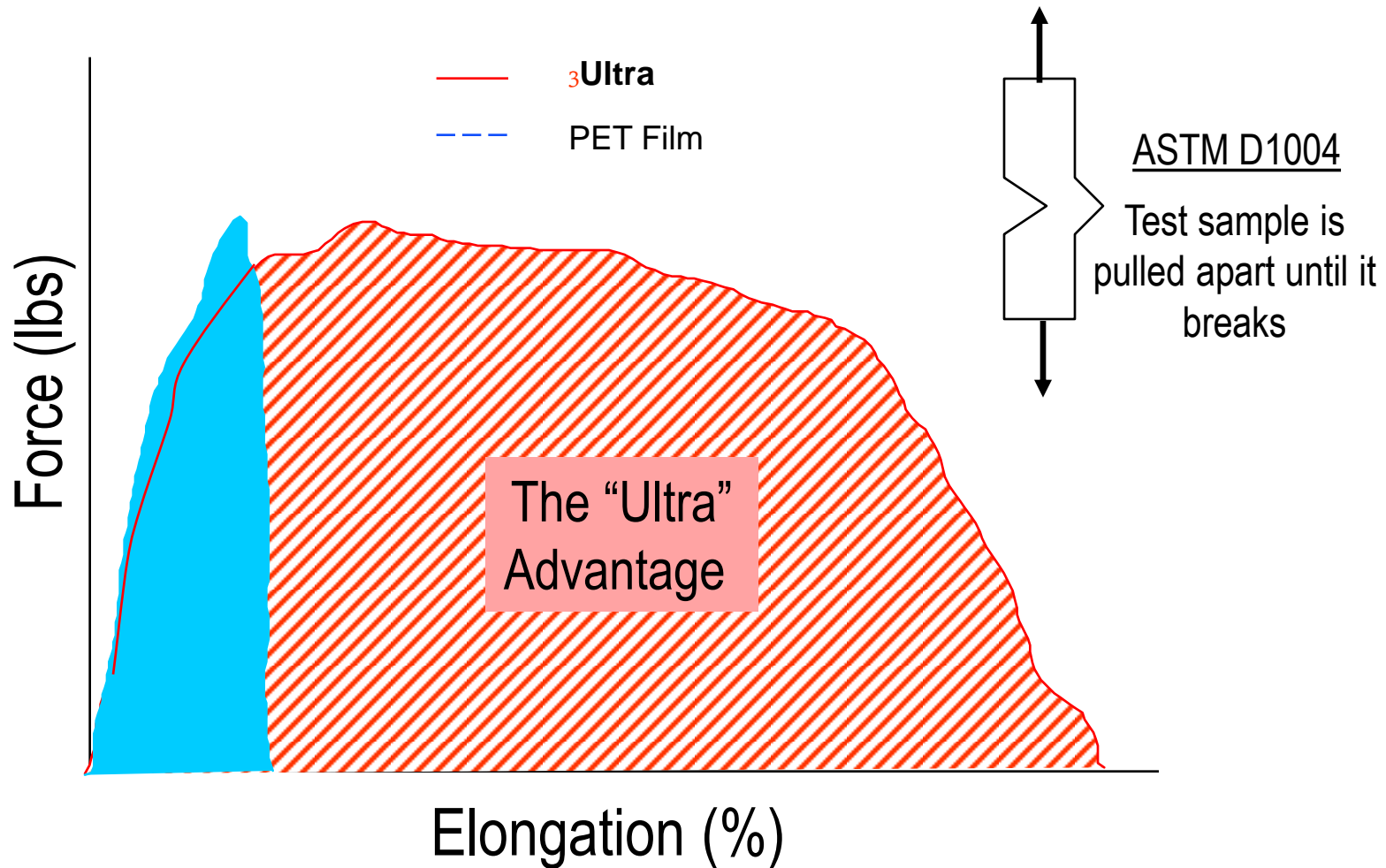


# Warranty

- Results may vary. **Warranty and Limited Remedy:** 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES OR CONDITIONS, INCLUDING ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If the 3M product does not conform to this warranty, the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price. **Limitation of Liability:** Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted. © 3M 2013. All rights reserved. 3M is a trademark of 3M Company.



# Graves Area Tear Strength



Graves Area (lbs%) is the area under the curve